



What do we know?

Previous results from the *Beckley/Imperial Research Programme* reported striking improvements in the depression scores of 12 treatment-resistant depressed patients. Key findings were:

- All 12 participants improved after psilocybin-assisted psychotherapy treatment
- 67% of participants were in remission (depression-free) at 1 week post-treatment
- 42% were still in remission after 3 months

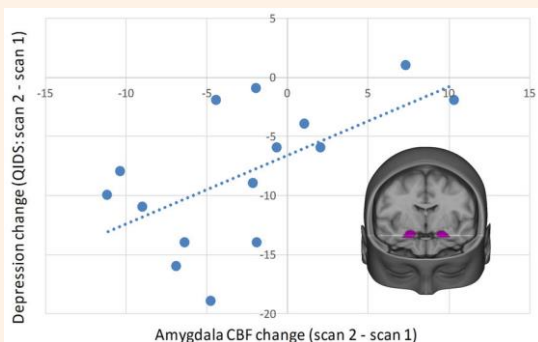
Why did we do this study?

The aim of this study was to investigate the changes in brain function underlying the improvements observed in patients with treatment-resistant depression. This study had a particular focus on the 'after-glow' phase of the psilocybin treatment, which is characterised by mood improvements and stress relief.

We predicted that some post-treatment changes in brain function within areas implicated in depression would correlate with both immediate and longer-term clinical improvements.

Neuroimaging findings

- On the day following the second psilocybin session, **cerebral blood flow (CBF) to the amygdala was decreased**, and this **correlated with reduced depression scores**



- Regions of the **default mode network (such as the vmPFC and lateral parietal cortices) were more connected** after treatment, and this **predicted how effective the treatment would be at five weeks**.

What did we do?

- 19 patients with moderate to severe treatment-resistant depression received two separate doses of psilocybin (10mg and 25mg, orally) 7 days apart.
- Arterial spin labelling (ASL) and blood oxygen level dependent (BOLD) scans were used to measure changes in cerebral blood flow (CBF) and resting-state functional connectivity before and one day after the second psilocybin session.
- Symptoms were evaluated using standard measures: Beck Depression Inventory (BDI), State-Trait Anxiety Inventory (STAI) and Quick Inventory of Depressive Symptoms (QIDS) at 1 and 5 weeks post-treatment.

Decrease in depression scores

- Treatment with psilocybin produced rapid and sustained antidepressant effects.
- All 19 patients showed some decrease in depressive symptoms at 1 week. 12 patients met criteria for clinical response, with >50% reduction in depression score.
- After 5 weeks all but one patient continued to show some decrease in depression score. 47% of patients had clinically-significant reductions in depression.

Why is it important?

- These results fill an important knowledge gap regarding the post-treatment neurological effects of psilocybin, and are the first in depressed patients.
- The brain changes observed after treatment are different to previously observed acute effects of psilocybin and other psychedelics. Specifically, whereas the acute psychedelic state in healthy volunteers is characterised by local desegregation and global integration of networks, post-psilocybin there appear to be trends toward network re-integration and minimal effects on global integration
- Although unexpected, these changes were related to clinical outcomes, highlighting a potential dichotomy between the acute psychedelic experience and its long-term therapeutic effects.

About the research team

Amanda Feilding is the founder and director of the Beckley Foundation. She and David Nutt are Co-Directors of the *Beckley/Imperial Research Programme*. Robin Carhart-Harris is the Programme's principal investigator.